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UNIVERSITY OF ALBERTA

Eating Attitudes and Behaviours of High Performance Female Adolescent Athletes

BY

© Paula Baker

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Masters of Science.

IN

DEPARTMENT OF PHYSICAL EDUCATION AND SPORT STUDIES

EDMONTON, ALBERTA

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled Eating Attitudes and Behaviours of High Performance Female Adolescent Athletes submitted by Paula Baker in partial fulfilment of the requirements for the degree of Masters of Science

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ABSTRACT

This study assessed the incidence of eating disordered tendencies and body fat measures in high performance female adolescent athletes. Three groups were studied and compared: 1) 31 athletes involved in sports emphasizing leanness (LEAN) (gymnastics, figure skating, diving); 2) 46 athletes involved in sports that do not emphasize leanness (NON-LEAN)(basketball, volleyball, field hockey); and 3) 42 control subjects who did not participate in high performance sport (CONTROL).

These subjects were recruited on a voluntary basis and self-reports were used to assess eating attitudes and behaviours (ie. EDI, EAT, demographic form). Body fat measures consisted of a sum of five skinfolds (SOS) in addition to measures of height, weight and a subjective visual rating of adiposity.

From the results, it was concluded that the athletes in the LEAN emphasized sports were predominantly leaner, lighter, shorter and exhibited more eating disordered tendencies than the athletes in the NON-LEAN emphasized sports. Additionally athletes in the LEAN group had a tendency to overestimate their fat level. Conversely, there appears to be a health benefit associated with being involved in the NON-LEAN emphasized sports.

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TABLE OF CONTENTS

CHAPTER PAGE

I. INTRODUCTION....1

Statement of the Problem....3

Purpose of the Study....3

Delimitations....5

Limitations....5

Definitions....5

II. REVIEW OF LITERATURE....7

Measurement of Prevalence of AN....7

Anorexia Nervosa and Sport....12

Other Factors Affecting AN Tendencies....14

Peers and Coaches....15

The Nature of Sport and its Impact on AN..17

Media....20

Community and the Roles of Women....22

Summary....23

III. METHODS....25

Subjects....25

Methods and Procedures....25

Data Analyses....27

IV. RESULTS....28

A. Physical Characteristics of Subjects....28

B. Demographic Characteristics....29

i. Age of Menstruation and Regularity...29

ii. Ethnicity and Race....29

iii. Dieting Frequency and Encouragement..30

TABLE OF CONTENTS

CHAPTER PAGE

iv. Physical Activity Levels and Encouragement.....31

v. Researcher versus Subject Visual Rating.....33

vi. Chi-Square Analyses of Visual Ratings.....34

C. Eating Disorder Inventory and Eating Attitudes Test.....37

X. DISCUSSION.....39

Physical Characteristics of Subjects.....39

Age of Menstruation and Regularity.....41

Ethnicity and Race.....42

Dieting Frequency and Encouragement.....42

Physical Activity Levels and Encouragement.....44

Researcher versus Subject Visual Rating...45

Eating Attitudes Test.....46

Eating Disorder Inventory.....48

XI. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.....51

Summary.....51

Conclusions.....53

Recommendations for further study.....53

REFERENCES.....54

APPENDICES.....59

Appendix A: EDI Questionnaire.....59

Appendix B: EAT Questionnaire.....63

TABLE OF CONTENTS

CHAPTER PAGE

Appendix C: Demographic Form.....65

Appendix D: Letters of Consent.....67

LIST OF TABLES

TABLE PAGE

II.1 SUBSCALES OF EATING DISORDERED TENDENCIES.....8

IV.2 PHYSICAL CHARACTERISTICS OF SUBJECTS.....28

IV.3 MEAN AGE OF MENARCHE FOR EACH GROUP.....29

IV.4 FREQUENCY OF DIETING.....30

IV.5 PHYSICAL ACTIVITY LEVEL OF SUBJECTS.....32

IV.6 SUBJECTIVE VISUAL RATING FOR SUBJECTS.....33

IV.7 CHI-SQUARE ANALYSIS OF LEAN ATHLETES.....34

IV.8 CHI-SQUARE ANALYSIS OF NON-LEAN ATHLETES.....35

IV.9 CHI-SQUARE ANALYSIS OF CONTROL SUBJECTS.....36

IV.10 SUBJECTS TOTAL AND MEAN SCORES FOR EDI AND EAT.....37

LIST OF FIGURES

FIGURE PAGE

I.1 Model: Continuum of Perceived Pressure for Body Leanness.....4

CHAPTER I

INTRODUCTION

There is strong evidence that, in recent years, intense pressures have been placed on young women to conform to an unrealistic standard of slenderness which has resulted in various diet strategies and eating disorders (Overdorf, 1987; Black and Burckes-Miller, 1988a). Associated with this is the prevalence of anorexia nervosa tendencies emerging in the female athlete's world (Moriarty and Moriarty, 1991). These pressures are further compounded in young female athletes where reducing fat through restricted food intake to enhance performance abilities is a common practice (Garner et al., 1984; Brooks-Gunn et al., 1986; Black and Burckes-Miller, 1988a).

Many athletes lose weight to achieve their ideal weight for competition (Black and Burckes-Miller, 1988a). The level of body fat is a key factor in performance in competitive sports because excess body fat can slow speed, limit endurance and have no positive effect on strength (Morgan, 1982). In sports such as gymnastics, diving or figure skating, where aesthetic image is important, one fits in better with the cultural ideal if one is thinner (Black and Burckes-Miller, 1988c; Sesan, 1989).

The health and injury risks associated with poor nutrition, caloric restriction and eating disordered tendencies in high performance female athletes have been the focus of attention in recent years (Morgan, 1982; Brooks-Gunn et al., 1986; Dummer et al., 1987; Borgen and Corbin, 1987). The majority of the studies on

eating disorders have concentrated primarily on university-aged athletes who have displayed anorexic tendencies and/or symptoms (Borgen and Corbin, 1987; Black and Burckes-Miller, 1988b; Chopak and Nicholson, 1991; Black and Burckes-Miller, 1991; Overdorf, 1991). While this information has proven valuable, concern should also be directed towards the many younger female adolescent athletes involved in highly competitive scholastic sports programs. Estimates have suggested that between 5 - 20% of the female high school population and an even higher percentage of university female populations are involved in some form of maladaptive eating behaviour (Moriarty and Moriarty, 1991). It is important to consider that a high performance athlete's career includes both physical and mental training, which may begin well before university-age. Thus there is a possibility of acquiring and nurturing maladaptive eating behaviours and attitudes at an earlier age than has been typically studied. These young athletes, with the ultimate goal of winning, are also exposed to pressures from family, peers, and coaches to be excessively lean (Morgan, 1982; Brooks-Gunn et al., 1986; Black and Burckes-Miller, 1988b; Sesan, 1989). In addition, studies have suggested that decreasing body weight and body fat does not end at the goal of being excessively lean in order to achieve the highest physical performance. Instead it continues in sports such as gymnastics, diving and figure skating, which emphasize body composition and leanness purely for the aesthetic component of these sports (Brooks-Gunn et al., 1986; Black and Burckes-Miller, 1988c; Sesan, 1989). When the demands of adolescence are joined with the physical, psychological, and societal stresses of being a high performance athlete, the

consequences of abnormal eating behaviours and attitudes are of considerable concern. Many young females succumb to these pressures to be excessively lean (Garner et al., 1984; Black and Burckes-Miller, 1988a; Moriarty and Moriarty, 1991).

Statement of the Problem

Limited past research has indicated that there is a higher incidence of eating disordered tendencies and low body fat measures among high performance female adolescent athletes in sports that emphasize leanness such as dance (Grandjean, 1991), gymnastics (Campbell, 1986), swimming (Benson, 1991) and figure skating (Sesan, 1989). However, little is known about how these eating disordered tendencies and body fat measures compare with non-athletic adolescents or athletes in non-weight emphasized sports such as basketball, field hockey or volleyball. Although female adolescents in general are particularly vulnerable to the onset of eating disordered tendencies, little research has examined the prevalence among female adolescent high performance athletes.

Purpose of the Study

The purpose of this study was to assess the incidence of eating disordered tendencies and body fat measures in high performance female adolescent athletes. Three groups were studied and compared: 1) athletes involved in sports emphasizing leanness (LEAN) (ie. gymnastics, figure skating, diving); 2) athletes involved in sports not emphasizing leanness (NONLEAN)(ie. basketball, field hockey, volleyball); and 3) a group of gender matched control subjects who did not participate in high performance

sport (CONTROL).

The model in figure 1 is a hypothetical continuum that female (adolescent) athletes (NONLEAN, and LEAN) would appear to be situated along. The LEAN athletes would be closer to the high pressure end of the continuum, where aesthetic qualities are needed in specific sports (ie. gymnastics), while the NONLEAN athletes would be at the opposite end of the hypothetical continuum, where aesthetic qualities in their sport (ie. basketball) are not considered as important as, for example, physical competence.

Model: Continuum of Perceived Pressure for Body Leanness

non-aesthetic---------- aesthetic
(non-lean) (lean)
least pressure high pressure

Figure 1

It was hypothesized that the athletes from the LEAN group would have more eating disordered tendencies while maintaining a lower amount of body fat than the subjects from the NONLEAN and CONTROL groups. In addition, it was also hypothesized that since the control group is not part of the sport subculture and yet are still subjected to sociocultural pressures to be thin, that they may also exhibit eating disordered tendencies to some degree, and may in fact be scattered throughout this continuum.

Delimitations

1) The subjects included two groups of female adolescents: non-athletes and high performance athletes. The athletes were subdivided depending upon the nature of their sport (LEAN versus NON-LEAN).

2) Subjects were measured within their familiar athletic and school settings.

3) The independent variable was female adolescents and the dependent variables were: body fat measurements (sum of five skinfolds (SOS) - tricep, subscapular, bicep, suprailiac, medial calf), height, weight, the Eating Disorder Inventory (EDI) (Appendix A), Eating Attitudes Test (EAT) (Appendix B), demographic form (Appendix C), and subjective visual rating of adiposity.

Limitations

1) Subjects were recruited on a voluntary basis.

2) Self-reports were used with regards to eating attitudes and behaviours (ie. EDI, EAT and demographic form) and thus under-reporting or over-reporting about maladaptive eating behaviours may occur.

3) Body composition as estimated by the five skinfolds is limited by the guidelines of standardized procedures.

Definitions

Anorexia nervosa (AN) is characterized by a relentless pursuit of thinness that is achieved through self-starvation (Slavin, 1987; Black and Burckes-Miller, 1988c; Johnson and Tobin, 1991). Individuals with AN have an intense fear of becoming obese (even

when underweight) and an inability to accurately see their body weight, size or shape (Johnson and Tobin, 1991; Grandjean, 1991). This disorder can only be clinically diagnosed through the Diagnostic and Statistical Manual for Mental Disorders (DSM-IIIR).

Bulimia is defined as 'binge-eating', followed by purging, either through self-induced vomiting or use of laxatives (Grandjean, 1991).

Eating disordered tendencies are defined as significant eating disorders, but who do not meet the DSM-III-R criteria for anorexia nervosa or bulimia (Sundgot-Borgen, 1994).

Excessive leanness refers to a percentage of body fat that is more than two standard deviations below the mean for any given demographic group (Thornton, 1990).

Dieting has been defined for the purpose of this study as the restriction of caloric intake with the overall result of weight loss.

To be considered a high performance athlete, the subject had to be between the ages of 14 and 18 years old and be actively competing at or beyond the provincial level.

LEAN sports were defined as sports that not only subjectively judge athletic attributes or capabilities but also are evaluated on body composition (aesthetics) and structure as a necessary component to be successful in the sport.

NONLEAN sports were defined as sports not requiring excessive leanness or association with a subjective aesthetic judgement.

CHAPTER II

REVIEW OF THE LITERATURE

Measurement of Prevalence of Anorexia Nervosa

Diagnosis of anorexia nervosa (AN) can only be done by a physician with the use of the Diagnostic and Statistical Manual for Mental Disorders (DSM-IIIR). The most recent version of the DSM-IIIR is considered the best guideline for diagnosing AN (Slavin, 1987; Johnson and Tobin, 1991). The diagnostic criteria of the DSM-IIIR for AN includes: 1) intense fear of becoming obese, which does not diminish as weight loss progresses; 2) disturbance of body image; 3) refusal to maintain body weight over a minimal normal weight for age and height; 4) no known physical illness that would account for the weight loss; and 5) in females, absence of at least three consecutive menstrual cycles when otherwise expected to occur (Slavin, 1987; Johnson and Tobin, 1991; Grandjean, 1991).

A number of scales have been developed to measure eating disordered tendencies; the two most commonly used are the Eating Disorder Inventory (EDI) and Eating Attitudes Test (EAT) (Table 1).

The EDI consists of 64 self-report items measuring eight behavioural and psychological traits (subscales) that are common among anorectics and bulimics. The EDI is appropriate for use with any population ages 12 and over and/or those that are capable of understanding the items (Hersen and Bellack, 1988). This questionnaire was not designed to be used as a diagnostic tool but rather in conjunction with clinical judgements about patient with

TABLE 1: SUBSCALES OF EATING DISORDERED TENDENCIES

EATING DISORDERS INVENTORY	EATING ATTITUDES TEST
1. Drive for Thinness (reflect a large wish to lose weight and fear of fat)	1. Dieting (degree of avoidance of fattening foods and pre-occupation with being thinner)
2. Body Dissatisfaction (related to body-image distortions)	2.Bulimia and Food Preoccupation (the presence of intrusive thoughts about food and the symptoms of bulimia)
3. Bulimia (the tendency towards episodes of uncontrollable binging and self-induced vomiting)	3.Oral Control (the degree of self-control around eating and the perception of pressure from others to gain weight)
4. Ineffectiveness (assesses feelings of general inadequacy, insecurity, and lack of control over one's life)	
5. Perfectionism (a characteristic theme of AN)	
6. Interoceptive Awareness (perceived impairment in recognizing and accurately identifying emotions of hunger and satiety)	
7. Interpersonal Distrust (reflects a sense of alienation and a general reluctance to form close relationships)	
8. Maturity Fears (the desire to retreat to the security of the preadolescent years because of the over-whelming demands of adulthood)	

eating disorders. It is also recommended for use as a screening device, outcome measure or as aid in typological research. The EDI

is unique in that it measures both the cognitive and behavioural characteristics associated with AN and bulimia and also measures the psychological traits that differentiate anorexics from bulimics (Conoley and Kramer, 1989).

The first three subscales, drive for thinness, body dissatisfaction and bulimia, focus on behaviours and attitudes concerning weight, shape and eating, while the remaining five subscales are relevant to psychological dimensions. The EDI has demonstrated good reliability and validity. For anorexic patients, the reliability for the four EDI subscales using the Cronbach's alpha range from .83 to .93. The standard errors of measurement for the subscales range from 1.9 to 2.9 and item subscale correlations range from .23 to .79 (Yates, 1988). The criterion validity of the EDI was obtained by: a) correlating anorectics subscale scores with clinicians ratings of the patients; b) demonstrating that a small group of recovered AN patients showed significantly lower scores on each subscale of the EDI and not higher than those for AN patients; and c) demonstrating that the bulimia subscale differentiated AN patients from those with the complication of bulimia (Yates, 1988).

The EDI items are scored so that the most "anorexic" response receives the highest score; subscale scores are the sum of item scores. The raw scores for each subscale must be interpreted with respect to the norms for that subscale. Normative data are available for AN patients, female American college students, female American high school students and male American college students (Hersen and Bellack, 1988).

Another objective, self-report measure of the symptoms of AN

is the Eating Attitudes Test (EAT), which exists in two forms: the EAT-26 and EAT-40. The EAT-26 is a revised version of the EAT-40, designed to be economical in both administration and scoring time. It is intended to be used as a viable prognostic tool and outcome measure for AN and bulimia. In addition, the EAT-26 has also been employed successfully as a screening instrument to identify eating disturbances in nonclinical samples (Garner et al., 1982).

The EAT-26 has demonstrated good reliability and validity. For AN patients, standardized Cronbach's alphas for the EAT-26 range from .83 to .92. For female nonclinical subjects, similar reliabilities range from .46 to .86 with only the coefficients for factors two (Bulimia and Food Preoccupation) and three (Oral Control) being less than .80 (Hersen and Bellack, 1988).

A validity coefficient of .87 was obtained by correlating the total score with group membership (AN or female controls). Male controls, obese subjects, and a small group of clinically recovered AN patients also demonstrated scores that were low and in the range of scores for female college women. Convergent and discriminant validity for the EAT-26 and its three factors were obtained by correlating these scores with clinical features and other psychometric measures that are relevant to AN. The EAT-26 consistently maintains a strong correlation with clinical and psychometric variables (Hersen and Bellack, 1988).

An examination of the item content between the EDI and EAT indicates some similarity (eg. Drive for Thinness subscale (EDI) with Dieting subscale (EAT); Bulimia subscale (EDI) with Bulimia and Food Preoccupation subscale (EAT)) between the scales. The EAT factors tend to be broader in focus than those of the EDI. In

addition, the subscales of the EDI were deductively derived, followed by empirical validation, while the EAT factors were inductively derived from an initial pool of items reflecting symptoms of AN. Despite some of this overlap, the EDI is not intended as a replacement for the EAT, or vice versa. The EAT is a sound measure of a range of symptoms common in AN whereas the EDI focuses more on the specific cognitive and behavioural areas which may aid in distinguishing those with serious psychopathology from extreme dieters (Garner et al., 1983).

Self-Report Questionnaires

Recent studies have shown that self-report methods are relatively reliable and valid measures. Schlossberger et al (1992) examined the accuracy of self-report measures of pubertal maturation by early adolescents. They found that there was a tendency for subjects to overestimate their development at early stages of maturation and underestimate development at later stages. Sallis et al (1993) assessed the reliability and validity of several self-reports of physical activity. The results indicated that validity improved with age and that physical activity recalls of children as young as the fifth grade were of adequate reliability and validity to use in research. A review article by Hodges (1993) indicated that children can reliably self-report and that the information they provide can concur with the opinion of adults' knowledge about them. Another study by Fortenberry (1992) revealed similar results, where the purpose of the study was to compare adolescents' self-report of height and weight with measured height and weight to assess possible bias in self-report.

Although these studies have shown that self-reports have good reliability and validity in adolescents, there have been few studies done on the reliability and validity of the EDI and EAT self-reports. In fact, it has been found that erroneous reporting is occurring in these questionnaires in relation to clinical interviews (Sundgot-Borgen, 1993). This may be attributed to the secretiveness of eating disordered tendencies and what it may cost an athlete to admit to these maladaptive behaviours (Sundgot-Borgen, 1994).

Anorexia Nervosa and Sport

For the general population of women, the prevalence of AN is estimated at 5 to 20%, while bulimia is approximated to be as high as 10% (Moriarty and Moriarty, 1991; Taub and Blinde, 1992). This prevalence rate could be potentially underestimated due to the secrecy of AN and eating disorders (Sundgot-Borgen, 1994).

Research has been directed towards the increasing percentage of female athletes that exhibit tendencies of anorexia nervosa (Fairbanks, 1987). Black and Burckes-Miller (1988b), in a study involving 695 female and male university athletes, examined the prevalence of undesirable eating behaviours and attitudes of female and male athletes through a questionnaire. This was a unique questionnaire in such that it was designed specifically for an athletic population. They reported that 59% of the athletes engaged in excessive exercise as a means of controlling weight. An interesting finding was that eating disorder behaviours and attitudes were not gender specific, although some gender differences were noted. For example, female caucasian athletes routinely thought about food and weight and perceived themselves as fat more

so than the male athletes.

Katz (1986) suggested that extreme exercise such as long distance running can sway the participant to develop anorectic tendencies. His theory suggests that when weight loss is followed by excessive exercise, certain biological and social reinforcers become evident. These reinforcers consist of diminished appetite, increased narcissistic investment in the body, increased endorphin levels and noticeable weight loss. Athletes then gain societal approval for their success from their peers, coaches, doctors or family. It is important to note that the conclusions of the study were based upon two cases studies of male athletes and therefore have no generalizability to the population at large.

Dummer et al (1987) studied the use of weight-modification techniques by young swimmers (487 girls and 468 boys aged 9 to 18 yrs) at a competitive swimming camp. Their data revealed that many young swimmers had misperceptions about their body weights, with girls most likely to perceive themselves as overweight. In addition, it was found that swimmers' decisions to lose weight were based on their perceptions and not on their actual weights. Approximately 15.4% of the girls and 3.6% of the boys used some form of pathogenic (ie. laxatives, self-induced vomiting) weight loss techniques.

Brooks-Gunn, Hamilton and Warren (1986) found through their research on female ballet dancers that current national ballet companies have rigid standards for height, body shape and composition. Physique is emphasized for the aspiring ballet dancer auditioning for the corps de ballet. The most technically accomplished dancer may not be accepted into the company if their

body size or physical imperfection does not portray the 'right' look. Therefore, there is constant concern about shedding pounds to attain thinness, which then becomes part of a dancer's life (Brooks-Gunn,et al., 1986).

Garner et al (1984) assessed the relevance of competitiveness and its' effects on anorexic tendencies. He compared scores on the EAT of dance versus music students in high expectation settings and found dance students deviated further from their average body weight (-17.9%) than the music students (-6.3%). Average body weight was defined as 20% below the expected weight based on population norms. The athletes were further subdivided and placed in different levels of competitive situations. This analysis demonstrated that those in competitive settings were -19.8% deviant from average body weight, while those in less competitive settings were only -8.6% from normal body weight. These results suggest that competitiveness has a direct relationship with body composition. With females in activities such as dance (and those of a similar nature, ie., gymnastics, figure skating, and diving) where the expectation of slimness in addition to physical demands are placed upon the participants, the possibility of establishing an eating disorder is attenuated (Garner et al., 1984).

Other Factors Affecting AN Tendencies

A factor affecting AN tendencies suggested by Black and Burckes-Miller (1991) that should also be considered is the perceived potential the athlete possesses. The more genetic potential an athlete has of obtaining that competitive edge and doing their best all the time, the more energy may be put into

extreme measures of gaining an advantage which would result in the enhancement of technique, appearance and physical performance (Overdorf, 1987; Black and Burckes-Miller, 1991). One way of obtaining all these goals and satisfying the cultural pressures associated with sport is through unhealthy eating behaviours which could lead directly to an eating disorder such as AN (Black and Burckes-Miller, 1988a).

Peers and Coaches

Being a winner is highly valued by our society and often people will resort to negative behaviours to win (Overdorf, 1987). The importance of winning may change depending on the level of the sport and the emphasis placed on it (Black and Burckes-Miller, 1991).

Peers can influence both team situations and individualized activities (Black and Burckes-Miller, 1991). When considering a team situation, a strategy to regulate weight and food intake could lead to instant admiration or acceptance by the individual's peers. In addition, athletes may teach one another unhealthy attitudes, behaviours and methods of maintaining the desired weight (Moriarty and Moriarty, 1991). This is also applicable to individualized sports such as figure skating and diving (Chopak and Nicholson, 1991). It has been suggested by Black and Burckes-Miller (1991) that there may be a contagious effect amongst athletes, particularly when a less successful athlete (prone to AN) watches an athlete succeed who uses unhealthy practices.

The 'thin is in' mentality of society is reflected in the attitudes of many coaches (Overdorf, 1987). While some coaches may

be concerned with the athlete's welfare, others are more concerned about winning, which precipitates getting the athlete into the best physical condition for competition (Black and Burckes-Miller, 1991; Overdorf, 1987). Weight loss or gain is a beneficial and a necessary part of a well-designed training program. Almost all athletes at some point in their careers are concerned about controlling their body weight. Lowering body weight may help achieve maximal athletic performance (Fleck, 1983; Rosen et al., 1986). Huber (1983) and Smith (1980) reported that leaner bodies may be a benefit in sports that require lightness for speed or vertical motion.

With coaches aware of the problems associated with a high percentage of body fat, the message to athletes is clear - lose fat (Overdorf, 1987). Thus pressure can escalate for the athlete as a direct result of the coach's attitude and potential Vince Lombardi approach that "winning isn't everything, it's the only thing" (Overdorf, 1987). This ideology was examined in a study by Benson (1991) on elite female swimmers. Through questionnaires, Benson (1991) found that the pressure to lose weight, especially if negative or punitive, was very detrimental to elite women swimmers. The open-ended responses by the swimmers concerning punishment for not meeting weight goals indicated insensitivity and misguidance by a number of the swimming coaches.

Benson (1991), in the same study, also investigated swimming coaches' ideologies concerning weight loss in elite female swimmers. He found that these coaches were using the leanness of male swimmers as a comparison and gold standard for their female swimmers to obtain. This is unrealistic considering that essential fat for men

is approximately 5%, whereas women have an additional 9% body fat that is sex specific (Katch et al., 1980). Additionally, excessive leanness is not always beneficial in swimmers since it cuts down on the buoyancy and increases water resistance (Benson, 1991).

Coaches want their athletes to excel and reach their highest performance levels, and for most athletes this demand will cause no problems. However, as Overdorf (1987) states, for the female athlete gravitating towards eating disorders, the large amount of pressure to win may lead to an eating disorder.

Black and Burckes-Miller (1991) suggest that some coaches' comments and practices around eating and body weight maintenance, that imply expectations with no guidance about how to proceed in a safe and effective manner, regardless of intent, can result in harm and encourage unhealthy eating behaviours. Situations such as having upper weight limits for athletes but not lower limits, innocent remarks about an athlete being overweight or out of shape, or having group or public weigh-ins as well as posting body fat percentages can all be detrimental, whether the intent was evident or not (Overdorf, 1987; Benson, 1991; Black and Burckes-Miller, 1991).

The Nature of Sport and its Impact on AN

Few studies have been directed towards the nature of sport and its impact on AN. Borgen and Corbin (1987) examined how sport can either facilitate or prevent AN, depending on the nature of the sport. They utilized the Eating Disorder Inventory (EDI) and a demographic questionnaire to find the incidence of eating disordered tendencies among 521 athletes and 447 controls. They divided the

athletic group, depending on the nature of the sport into: A) Sports emphasizing leanness of the aesthetic, weight dependent and endurance nature; B) Sports with no emphasis on leanness of technical, power and ball games nature.

Borgen and Corbin (1987) found that in comparison between the controls and athletes there was little difference on the EDI scores. However, when the two athletic groups were compared the athletes defined as being at risk of developing anorexia were those in the subgroup of activities that emphasize leanness. These athletes showed significant symptoms of anorexia. Reasons for dieting cited by athletes included: to enhance performance (67%); and told by their coaches (38%), parents (27%), or doctors (5%).

Davis and Cowles (1989), completed a study of similar nature, where female athletes (age range of 15 - 24 years old) were categorized into two groups: 1) those who competed in sports where thin builds were considered advantageous (N=64) (ie. gymnastics) and 2) those who competed in sports that demanded a normal build (N=64) (ie. basketball). All subjects, including a control group of non-athletes (N=62), completed extensive questionnaires dealing with characteristics of AN (EDI), personality (The Eysenck Personality Inventory, Form A), achievement motivation (Edwards Personal Preference Schedule) and attitudes or behaviours related to lifestyle (Lifestyle Questionnaire). The results showed that the thin build group, even though they were thin, had greater weight and diet concerns, and were emotionally more liable and dissatisfied than the normal build group.

Benson et al (1990) reported similar findings in elite female adolescent athletes. They categorized athletes into two groups:

thin build (gymnasts) and normal build (swimmers), to examine whether build was a factor in the prevalence of AN tendencies. It was found that although there were significant correlations between the thin build athletes and anorexic tendencies, that disturbances in eating behaviours were not limited to sports that emphasize thin builds, but normal builds as well. It should be noted however, that swimming has been categorized in other studies as a sport that emphasizes leanness, and thus the finding of AN tendencies of swimmers in this study is not surprising. This study could be subjected to some scrutiny due to swimmers being used as normal build subjects, whereas in the past they have been perceived as thin build athletes.

Sundgot-Borgen (1993) examined the prevalence of eating disorders, and the possible difference between eating disorder symptoms and true eating disorders by using questionnaires compared with an interview and clinical evaluation. She studied elite female athletes (n=522) from 35 sports and nonathletic controls (n=448). From the 522 athletes, 122 athletes were administered the EDI and classified as "at risk" to develop eating disorders. Of these athletes, 92 met the criteria of the DSM -IIIR for eating disordered individuals and 30 athletes were classified not at risk and comprised the athletic control group . This paper only discussed the athletes. All were interviewed and clinically examined. A significantly higher number of athletes (18%) than control (5%) were found to actually suffer from eating disorders, particularly athletes competing in sports in which leanness or a specific weight were considered important. It was found that when results from the screening study were compared with the interviews and clinical

examinations a significant underreporting of eating disorders by the screening questionnaires among athletes occurred. This again could be attributed to the secrecy of eating disorders and discovering a potential problem in this area could mean exclusion from the team. The athletes also reported the use of other pathogenic methods in the screening study compared to what they reported in the interview.

In a recent review article, Sundgot-Borgen (1994) stated that the prevalence of subclinical and eating disorders is higher amongst female athletes than nonathletes. In addition, Sundgot-Borgen (1994) supports the contention that athletes competing in sports that emphasize leanness or specific body weight are more prone to develop maladaptive eating behaviours and eating disorders than those athletes competing in sports where these factors are not as significant. There have been concerns about the methodological weaknesses in past research which included poor description of the populations studied and questioned the methods of data collection (Sundgot-Borgen, 1994). Currently, it is unknown which is the best instrument or interview method for data collection concerning eating disorders.

Moriarty and Moriarty, (1991) suggest that physical activity itself does not precipitate eating disorders. It is instead the programs with emphasis on elitism, winning and body image and the use of weight loss to enhance performance that may be what serves as the precipitating factor in potential anorexic individuals.

Media

Much of the media's current focus contributes to reinforcing cultural emphasis on physical fitness and leanness (Barningham,

1981). Athletes may be the most susceptible to this cultural emphasis as they attempt to achieve the fit athletic look (Black et al., 1991). The ideal images presented by the media promises thinness to be a cure all for both physical and social problems ranging from sex appeal, enhanced quality of life to peak performance levels (Barningham, 1991; Black et al., 1991).

Patty Perry, Director of the Eating Disorder Clinic in Toronto, believes that the way fitness is marketed today is directly related to the increase of eating disorders (cited in Moriarty et al., 1991). Perry supports and explains this theory by:

> "....We sell fitness as an unmixed blessing, but this is not the case. Indeed, the fad proportion of fitness may be contributing to eating disorders. Women are trying to achieve weight control through over-exercise. It's not true that the more you do, the more it does for you." (cited in Moriarty et al., 1991)

Borgen and Corbin (1987) have also stated a similar idea regarding the media and AN. Others (Calabrese et al., 1983; Puglise et al., 1983) have speculated that the media's emphasis on physical fitness and leanness may promote an over-zealous attitude to obtain and maintain a low or extremely low body weight, that would eventually lead to eating disorders. Johnson and Tobin (1991) have described the current fitness movement as "old wine in new bottles": although the ultra-thin appearance has been replaced by a firm, more robust look of today; there has only been a shift from manipulating bodies through excessive dieting, to over-compensating by using extreme methods of exercise to lose weight (Johnson and Tobin, 1991).

Black et al (1991) have also reported that media may influence

the degree of body satisfaction among both the general and athletic population. He reported that one-seventh of the athletes he studied thought they were too fat, when in fact they had lost weight and were not overweight. In comparison, Leichner and Gertler (1989) reported that 63% of 675 high school girls were dieting; however on the average these girls were 5% below normal weight.

Community and the Roles of Women

With each passing decade, there is a rapid change in the roles of women. In the female athlete's case, a role conflict can occur with the dilemma of whether to behave according to what is expected of them in the realm of their gender role or rather to behave as an athlete (Garner and Garfinkel, 1980; Chopak and Nicholson, 1991; Black et al., 1991). As Moriarty and Moriarty (1991) summarizes the dilemma, today's women is expected "to have it all and do it in a size five dress".

Chopak and Nicholson (1991) suggest that the incidence of AN is higher among female athletes because of the stressful and semiclosed communities within the athletic environment. It is suggested that this may intensify sociocultural pressures to be thin.

Presently, our culture's preoccupation with thinness is often justified for health reasons and women are often made to feel guilty if they are not out exercising a large portion of the time (Moriarty, 1988a; Rice, 1988). There appears to be too much emphasis on exercise and fitness for the goal of losing weight to stay looking good, rather than for the goal of improving cardiovascular health and our overall health (Moriarty, 1988a).

Overdorf (1987) suggests there are a growing number of young women abusing their bodies in their quest for satisfying today's cultural thin ideal. She also provides evidence that certain sports are increasingly becoming vehicles for attaining that ideal. Simply stated, due to the cultural pressures, a lot of women are entering the sporting area for the wrong reasons (Overdorf, 1987).

Exercise has become "the" weight control technique of the eighties and nineties, however the emphasis on fitness in Canadian society emerged approximately at the same time as professionals began to see an increase in the incidence of eating disorders such as AN (Garfinkel, 1988). Because exercise is being viewed as such a virtuous activity in today's society, representing self-discipline and control, individuals using exercise to purge may be hard to convince of any harmful behaviour. As with dieting, exercise will be praised and encouraged by others, which explains why more than 50% of those suffering from AN engage in exercise for weight control purposes (Garfinkel, 1988; Lenskyj, 1991; Gougeon, 1993).

Summary

The cited literature suggests that some female athletes may be developing "dangerous lifestyles" to continue to compete effectively at a high level. Although most studies have examined university - aged male and female athletes, the majority of these athletes probably begin their athletic careers at an earlier age. This would then suggest that maladaptive behaviours and/or tendencies could also be evident at the adolescent age. In addition, the benefits of leanness or ectomorphism in specific sports may be precipitating factors in the development of eating disordered tendencies in female

university - aged athletes. However, few researchers have investigated these possible maladaptive factors in female adolescents. This study will utilize body composition measures and the EDI and EAT questionnaires to provide essential information on the comparison of athletic and non-athletic female adolescent population.

CHAPTER III

METHODS

Subjects

Adolescent (14-18 yrs) female high performance athletes were recruited on a voluntary basis through Provincial Sport governing bodies based on convenience and cooperation. The high performance athletes were divided into two groups: those whose sport emphasized leanness (LEAN) (gymnastics, figure skating, diving) and those whose sport did not emphasize leanness (NONLEAN) (basketball, volleyball, field hockey). By selecting from a variety of sport disciplines, the possibility of selection bias was decreased and a variety of coaching and sport ideologies regarding weight loss and eating behaviours or attitudes were provided.

A group of control non-athletic adolescent female subjects were randomly selected on a voluntary basis from two schools in the Edmonton public school system, again chosen on the basis of convenience and permission. To be considered a CONTROL, the subject was not participating with any organized team or sport whether it was in a school or club setting. However, a CONTROL subject could have been involved in recreational sports within the school such as an intramural event, as long as participation was limited to two times per week.

The total sample consisted of 119 subjects (42 non-athletes, 31 LEAN emphasized athletes, 46 NON-LEAN athletes).

Methods and Procedures

The study was described and informed consent was obtained for

all subjects prior to any measure being taken. Complete confidentiality regarding the results and measurements of the study was ensured by assigning subject numbers and not recording names. Coaches were not allowed access to any subject information, in group or individual form, but were supplied with a copy of an executive summary of the study. If a subject displayed severe eating disordered tendencies, a physician specializing in eating disorders was contacted for professional advice. Immediate feedback on skinfolds was provided verbally to the subjects privately. Athletes were measured within the athletic setting and non-athletes within the school setting. The study was approved by the Ethics Committee of the Faculty of Physical Education and Recreation.

Measurements taken included: height, weight, a subjective visual rating of body fat (Marshall et al., 1991) by both the subject and trained researcher, five skinfolds (CSTF, 1986), and a visual assessment of race. Questionnaires included: a demographic form (a unique questionnaire for controls was developed as requested by the school boards) , the EDI and the EAT. Height was measured to the nearest .1 centimetres and weight to the nearest .2 kilograms, with shoes removed.

Five skinfolds (triceps, biceps, subscapular, suprailiac, and medial calf) were measured according to the procedures outlined in the Canadian Standardized Test for Fitness Manual (CSTF, 1986). These skinfolds were summed and the total score was compared to Canadian population norms (CSTF, 1986). In addition, a visual rating of adiposity (Marshall et al., 1991) was done independently by both the researcher and subject to subjectively classify a subject's body fat levels. The visual rating scale consisted of

choosing one of the following: 1 - slim or skinny; 2 - average or ideal weight for height; 3 - slightly overweight or pleasantly plump and 4 - obese. This rating was done prior to all other measures.

The demographic questionnaire was answered first with the aid of the researcher if necessary. The EDI was given to the subjects after the demographic questionnaire followed by the EAT. The administration of the EDI and the EAT were done according to the guidelines for each questionnaire. No help was provided in the interpretation of the EDI and EAT questions; the only aid provided was defining a certain word (eg. carbohydrates).

Data Analyses

A one-way ANOVA was done to compare the statistical differences between the three groups and the separate subscales of each questionnaire. When significant differences were found Neuman - Kuels post hoc comparison tests were done to determine where the differences occurred.

A two-way ANOVA was done to compare the incidence of eating disordered tendencies, as determined by the total scores of the EDI and EAT, within and between the three groups. When significant differences were found Neuman - Kuels post hoc comparison tests were used to determine the location of those significant differences.

The anthropometric data of the three groups was analyzed with a one-way ANOVA. Again the Neuman - Kuels post hoc test was used when significant differences were found.

Chi-square analyses were done to compare visual ratings between the researcher and subject.

CHAPTER IV

RESULTS

A. Physical Characteristics of Subjects

The physical characteristics of the subjects are provided in Table 2.

TABLE 2: PHYSICAL CHARACTERISTICS OF SUBJECTS

GROUP	AGE (M±SD)	HT. (cm) (M±SD)	WT. (kg) (M±SD)	**SOS(mm) (M±SD)
LEAN (n=31)	15.9±1.25	161.4±9.0	*54.4±8.1	*56.1±14
NON-LEAN (n=46)	*16.5±1.4	*169.1±6	63.7±8.28	69.2±21
CONTROL (n=42)	15.2±.701	163.5±6.3	62.4±16.4	90.8±36

**SOS=sum of skinfolds
* significant at α=0.05 level.

The NON-LEAN athletes were statistically significantly older than both the LEAN and CONTROL subjects, while there was no difference between the LEAN and CONTROL groups. Similarly, there was no significant difference in height between LEAN and CONTROL subjects, while the NON-LEAN subjects were statistically taller. The LEAN group were significantly lighter and less fat than the NONLEAN and CONTROLS,while the NON-LEAN subjects were also statistically leaner than the

CONTROLS.

B. Demographic Characteristics

i. Age of Menarche and Regularity

Table 3 displays the age of menarche for each group of subjects. There were no statistical differences in menarche between groups.

TABLE 3: MEAN AGE OF MENARCHE FOR EACH GROUP

GROUP	AGE OF MENSTRUATION(yrs) (M±SD)
LEAN (n=31)	12.06 ± 4.123
NON-LEAN (n=46)	13.03 ± 1.318
CONTROL (n=42)	11.88 ± 2.200

Overall, 95.8% of the subjects had experienced menarche with 72.3% menstruating on a regular 28 day interval. Within the groups, 9.7% (3) of the LEAN athletes and 4.8% (2) of the CONTROLS (2) had not reached menarche; all NON-LEAN subjects had reached menarche. In addition, 10% percent of the LEAN athletes were amenorrhic and 29% did not menstruate on a regular 28 day interval.

ii. Ethnicity and Race

Approximately 92% of the sample was Caucasian, 5% East Indian, and the other 4% comprised of Asians, Native Indians

and Hispanics. The distribution of race was as follows: 1) LEAN group consisted of 1 Oriental and 2 East Indians/Filipinos (9.6%); 2) NON-LEAN group consisted of 1 Oriental and 1 African-American (4.3%); 3) CONTROLS consisted of 3 Orientals, 4 East Indians, 1 Native Indian and 1 Hispanic (21.4%). Overall, since the vast majority of subjects (92%) were Caucasian, the results of this study should be readily comparable with others in the literature.

iii. Dieting Frequency and Encouragement

Table 4 displays the number of times dieted by each group.

TABLE 4: FREQUENCY OF DIETING

	NUMBER OF TIMES SUBJECTS DIETED N (%)					
SUBJ.	NEVER	1-5	6-10	11-15	15+	TOTAL
LEAN	18 (58.1)	9 (29.0)	2 (6.5)	1 (3.2)	1 (3.2)	31 (26)
NON-LEAN	32 (69.6)	13 (28.3)	1 (2.2)	0 (0)	0 (0)	46 (38)
CONT.	23 (54.8)	12 (28.6)	4 (9.5)	2 (4.8)	1 (2.4)	42 (35)
TOTAL	73 (61.3)	34 (28.5)	7 (17)	3 (0.03)	2 (0.02)	119 (100)

Overall, the majority of subjects (61.3%) have never dieted. With those subjects having dieted, 1-5 times was the most frequent response (28.5%) in all three groups. Different individuals appeared to be primarily involved in encouraging the subjects to diet. In the LEAN group, 22.6% of the subjects considered coaches the most influential with regards to encouraging dieting. However, in the NON-LEAN group a number of individuals (coaches (2.2%), peers (8.6%), siblings (4.3%), parents (6.5%)) influenced the athletes. In contrast, the CONTROL group's encouragement to diet came largely from their mother (21.4%) and father (14.3%).

iv. Physical Activity Levels and Encouragement

Table 5 displays the number of times subjects were active throughout the week.

The overwhelming majority of LEAN (96.8%) and NON-LEAN (91.3%) athletes were classified as very active (active four times weekly for at least 15 minutes per session) while only a small percentage in both groups were classified as moderately active. Interestingly, the controls were scattered throughout the three categories with the majority being moderately active (54.8%) and a very small percentage (7.1%) considered very active.

TABLE 5: PHYSICAL ACTIVITY LEVEL OF SUBJECTS

	PHYSICAL ACTIVITY LEVEL N(%)			
GROUP	RELATIVELY INACTIVE*	MODERATELY ACTIVE*	VERY ACTIVE*	TOTAL N (%)
LEAN	0 (0%)	1 (3.2%)	30 (96.8%)	31 (26%)
NON-LEAN	0 (0%)	4 (8.7%)	42 (91.3%)	46 (38.6%)
CONTROL	16 (38.2%)	23 (54.8%)	3 (7.1%)	4 (35.2%)
TOTAL N (%)	16 (13.4%)	28 (23.5%)	75 (63%)	119 (100)

* relatively inactive = no activity outside of scheduled PE classes; moderately active = 1-3 times/week, minimum 15 min/sessions; very active = active 4+ times/week, minimum 15 min/session.

Overall, athletes started participation in sport at a variety of ages, with the largest percentage (25.2%) starting at age five. The age of participation ranged from one year (0.8%) to 12 years old (1.7%).

Encouragement in physical activity for the LEAN group was provided mainly by the father (83.9%), mother (67.7%) and best friend (48.4%). Encouragement also came from a variety of sources for the NON-LEAN group: mother (80.4%), father (73.9%), best friend (69.6%) and teacher (50%). In the

CONTROL group, the mother (47.6%), best friend (42.9%) and father (38.1%) all contributed in encouraging physical activity.

v. Researcher versus Subject Visual Rating

Table 6 displays the visual ratings done by the researcher and subjects for all groups.

The subjective visual rating consisted of 1 - skinny or slim; 2 - ideal or average weight; 3 - slightly overweight or pleasantly plump; 4 - obese or fat.

To interpret this table, as an example using the LEAN athletes, the researcher rated 11/31 (36%) as a 1 (skinny or slim) in comparison to the subjects where only 4/31 (13%) rated themselves as a 1.

Tables 7, 8 and 9 are breakdowns of Table 6 by subject groups.

TABLE 6: SUBJECTIVE VISUAL RATING FOR SUBJECTS

RATING	LEAN N(%)		NON-LEAN N(%)		CONTROL N(%)	
	RES.	SUBJ.	RES.	SUBJ.	RES.	SUBJ.
1	11(36)	4(13)	6(13)	6(13)	10(24)	6(14)
2	15(48)	21(68)	30(65)	27(59)	15(36)	11(26)
3	5(16)	6(19)	9(20)	13(28)	8(19)	23(55)
4	0 (0)	0 (0)	1(2)	0 (0)	9(21)	2(5)

vi. Chi-Square Analyses of Visual Ratings

Tables 7, 8 and 9 display the chi-square analyses of the researcher and subject visual ratings for the athletes and control subjects. For the purpose of these analyses, the researcher rating was considered the gold standard or expected value and the subject rating was the observed value.

The chi-square analyses showed that there was a significant difference between researcher and subject rating at the 0.05 level for all groups of subjects.

TABLE 7: CHI SQUARE ANALYSIS OF LEAN ATHLETES

	RESEARCHER RATING			
SUBJECT RATING	1	2	3	TOTAL N (%)
1	**4**	-	-	4 (12.9)
2	7	**13**	1	21 (67.7)
3	-	2	**4**	6 (19.4)
TOTAL N (%)	11 (35.5)	15 (48.4)	5 (16.1)	31 (100)

With the LEAN athletes, there was a 67.7% (21/31) agreement between the researcher and LEAN subject visual

ratings. Neither the researcher nor subjects classified individuals or themselves as a 4 (obese), and thus Table 7 only includes rankings from 1 to 3. In total, 10 athletes (32%) differed from the assessment of the researcher, with 1 athlete (10%) subjectively underestimating their body fat in comparison to the researcher, and 9 athletes (90%) overestimating their body fat.

TABLE 8: CHI-SQUARE ANALYSIS OF NON-LEAN ATHLETES

	RESEARCHER RATING				
SUBJECT RATING	1	2	3	4	TOTAL N (%)
1	**4**	2	-	-	6 (13)
2	2	**24**	1	-	27 (58.7)
3	-	4	**8**	1	13 (28.3)
4	-	-	-	-	0 (0)
TOTAL N (%)	6 (13)	30 (65.2)	9 (19.6)	1 (2.2)	46 (100)

Table 8 indicates that there was 78.3% (36/46) agreement between the visual ratings assessment of the researcher and the NON-LEAN subjects. Overall there were 10 athlete ratings

(21.7%) that differed from the researcher's assessment. Four athletes (40%) subjectively underestimated and 6 athletes (60%) subjectively overestimated their body fat in comparison to the researcher rating.

TABLE 9: CHI-SQUARE ANALYSIS OF CONTROL SUBJECTS

	RESEARCHER RATING				
SUBJECT RATING	1	2	3	4	TOTAL N (%)
1	**5**	1	-	-	6 (14.3)
2	4	**7**	-	-	11 (26.2)
3	1	7	**8**	7	23 (54.8)
4	-	-	-	**2**	2 (4.8)
TOTAL N (%)	10 (23.8)	15 (35.7)	8 (19.0)	9 (21.4)	42 (100)

Table 9 indicates that there was 52.4% (27/42) agreement between the researcher and CONTROL subject visual ratings. Of the 20 subjects that differed from the researcher assessment, 12 (60%) subjectively overestimated and 8 (40%) subjectively underestimated their body fat in comparison to the researcher rating.

C. Eating Disorder Inventory and Eating Attitudes Test

Table 10 contains all mean total scores and mean subscale scores and standard deviations for the EDI and EAT for all groups.

TABLE 10: SUBJECTS TOTAL AND MEAN SCORES FOR EDI AND EAT

	SUBJECTS SCORES (M ± SD)		
	LEAN	NON-LEAN	CONTROL
EDI			
Drive for Thinness	5.71±4.06	4.28±3.94	4.52±3.98
Inter. Awareness	6.48±6.08[a]	4.13±3.27[c]	6.02±3.94[a]
Bulimia	2.52±2.70	2.91±2.99	2.93±3.11
Body Dissatisfaction	6.16±5.08	6.69±4.15	7.05±4.49
Ineffectiveness	4.48±4.48[b]	2.63±3.30[c]	5.24±4.13[a]
Maturity Fears	4.55±2.89	3.69±2.94	3.83±2.45
Perfectionism	7.00±3.88	7.04±3.29	6.00±3.54
Interpersonal Distrust	2.97±2.92[b]	1.65±1.79[c]	3.45±2.73[a]
OVERALL TOTAL	39.8±23.2	33.0±13.5	39.0±15.9
EAT			
Dieting	10.5±10.45[a]	7.02±5.66	7.09±6.15[c]
Bulimia and Food Pre-occupation	2.52±3.23	1.69±2.33	1.97±2.33
Oral Control	5.52±3.4[a]	4.00±2.91[c]	4.83±2.87
OVERALL MEAN TOTAL	18.4±13.48[a]	12.7±7.53[c]	13.9±8.65

[a] statistically different from [c].
[b] statistically different from [c].

A two-way ANOVA was done to compare the incidence of eating disordered tendencies determined by the total EAT and EDI scores within and between the three groups of subjects.

No significant differences were found between or within groups at the $\alpha = 0.05$ level.

A series of one-way ANOVAs, using a Neuman -Kuels post hoc test revealed the following results:

1. The LEAN group scored significantly higher on the total score for the EAT than the NON-LEAN and CONTROL groups, while there was no statistical difference between NON-LEAN and CONTROL groups. There were no statistically significant differences found between groups for the total score of the EDI.

2. In both the Interpersonal Distrust and Ineffectiveness subscales, the CONTROL subjects scored significantly higher that the LEAN subjects, who scored significantly higher than the NON-LEAN subjects (ie. CONTROL>LEAN>NON-LEAN).

3. In the Interoceptive Awareness subscale (EDI), the NON-LEAN subjects scored significantly lower than both the LEAN and CONTROL subjects (ie. LEAN>CONTROL>NON-LEAN).

4. In the Dieting and Oral Control subscales (EAT), the LEAN group scored significantly higher than the NON-LEAN or CONTROL subjects, where there were no differences.

5. No statistical differences were noted between groups in the following subscales: Drive for Thinness, Bulimia, Body Dissatisfaction, Maturity Fears and Perfectionism (EDI); and Bulimia and Food Preoccupation (EAT).

CHAPTER V

DISCUSSION

Physical Characteristics of Subjects

The LEAN athletes were shorter, lighter and leaner than the NON-LEAN and CONTROL subjects which may be indicative of the physical requirements of their sports (ie. spins, leaps, jumps) (Brooks-Gunn et al., 1988). Weight is always an important factor when competing at a high level in sports. Some literature (Morgan, 1982; Brooks-Gunn et al., 1986; Black and Burckes-Miller, 1988c; and Sesan, 1989) suggests that it is more beneficial to be lighter for the LEAN sports such as diving, figure skating or gymnastics, where fat may inhibit performance because it can slow speed and limit endurance. Additionally, strength and skills are all accomplished more easily when the athlete is lighter (Morgan, 1982; Brooks-Gunn et al., 1986; Black and Burckes-Miller, 1988c; and Sesan, 1989). Thus, in addition to the physical demands of LEAN sports, there appears to be an increased importance placed on developing an aesthetically pleasing appearance.

The NON-LEAN athletes were significantly older, taller, heavier and less lean than the LEAN subjects, suggesting that a pre-pubescent body type in these types of sports may not be considered as advantageous as it is with the LEAN athletes (Litt, 1986). In addition it may also suggest that an aesthetically pleasing, ectomorphic body type is not as important for these sports. Instead, a physical component may be of primary importance, where skill level and co-ordination improve with age. The NON-LEAN

athletes are significantly taller, which could in part be due to pre-selection for certain sports (ie. basketball, volleyball) that were examined in the present study. Height is a definite advantage when competing in basketball or volleyball.

A sum of skinfolds (SOS) of 69.2 mm in the NONLEAN athletes represents the 35th percentile of the CSTF norms, a point at which the health risk is apparent in the Canadian population due to increased amounts of body fat. This is a somewhat surprising finding since these sports have a relatively high cardiovascular component that should maintain body fat at a relatively lower level. Excess fat inhibits performance no matter what type of sport the athlete is involved in and one might have expected the mean fat content in the NONLEAN athletes to be slightly lower (Morgan, 1982).

The CONTROL group is at more potential for health risk due to excess body fat than either of the athletic groups.

The general findings would seem to support the idea that athletes preselect to a sport, ie. LEAN emphasized sports require ectomorphic characteristics, while NON-LEAN sports rely on more mesomorphic builds with physical capabilities (Moriarty and Moriarty, 1991; Taub and Blinde, 1992). Pre-selection of a sport suggests that an individual's natural body type inherently steers the athlete to an appropriate sport (Brownell et al., 1992). In addition, the greater the extent to which an athlete's body deviates from the ideal for a particular sport, the greater the risk that the athlete will develop maladaptive eating behaviours to conform to that desired sport (Brownell et al., 1992).

Age of Menstruation and Regularity

Ten percent of the LEAN athletes were amennorrhic, while 29% did not menstruate regularly. Some LEAN athletes may be considered late maturers because they have not started menstruation. This late onset of menstruation may be a consequence of intensive activity, extreme dietary practices, and low body fat that is required to be a high performance athlete at such an early age (Braisted et al., 1985; Fears et al., 1985; Litt, 1986; Litt and Glader, 1986; Brooks-Gunn et al., 1988; Walberg and Johnston, 1991). However, at this point, the literature is inconclusive regarding theories of amenorrhea, dysmenorrhoea and high performance athletes. This literature base is limited not only by the lack of studies involving adolescent athletes but also by problems with definitions (ie. intensity, duration, frequency of athletic training, amenorrhea or menarcheal age), problems with measurement, small sample sizes, and a lack of controlled studies (Litt, 1986).

Although sports are similar in that high standards of technical proficiency are demanded of all first class athletes, they may differ in terms of requirements for body shape and size. Low weight and a certain body type is required of gymnasts, figure skaters and divers. A pre-pubescent body type appears to be beneficial and thus athletes in these sports tend to be late maturers (Litt, 1986). Conversely, the emphasis on weight and body shape in volleyball, basketball and field hockey may be minimized, while physical skill is emphasized. Thus athletes in these sports tend to develop their skills over a long period of time and become successful later than the lean-emphasized athletes. Maturation is thus less of an issue in these sports. In the present study, there

was no statistical difference in the start of menstruation between groups and thus support for the late maturation hypothesis in the lean-emphasized group is lacking. Our findings in the present study are similar to those of Braisted et al., (1988) who found that the average age of menarche for American adolescent girls is 12.9 years.

Virtually all the NON-LEAN and CONTROL subjects had begun menstruating, but approximately 28% were not menstruating on a regular basis. This percentage is similar to the LEAN subjects, thereby suggesting that this could be the "norm" for female adolescents.

Ethnicity and Race

There did not appear to be an effect of race on SOS, weight, EDI or EAT scores and therefore these influences will not be further reported.

Dieting Frequency and Encouragement

In contrast to the literature that states that 90% of girls have begun dieting by grade 4 (Moriarty, 1988), the majority of the subjects (60%) in this study had never dieted. Within those subjects having dieted, 1 - 5 times was the most frequent response in all three groups, primarily in the NON-LEAN (69.6%) and CONTROLS (54.8%). This would seem logical since subjects in the NONLEAN and CONTROL groups were both heavier and fatter than the LEAN athletes. However, it does not support the theory that those athletes in LEAN sports are more prone to diet due to the nature of their sport (Borgen and Corbin, 1987; Davis and Cowles, 1989; and Benson et al., 1990). This could be partially explained by the lack of definition

of the word "diet". To some subjects it may have meant the restriction of specific foods for a certain amount of time and to others it could have meant fad diets or some type of fasting. In addition, the lack of clarity may have aided in the underestimating or overestimating of the dieting frequency in the subjects.

The LEAN athletes considered their coaches the most influential (22.6%) person with regards to their dieting behaviour. This does not necessarily mean that coaches are directly responsible for the LEAN athletes dieting behaviour or the occurrence of eating disorders. The LEAN athletes compete in individual sports where time spent with one person (ie. coach) is a normal, daily occurrence and which could have some type of direct influence, whether positive or negative on the athlete and their behaviours. A number of studies (Sundgot-Borgen, 1994) have reported that athletes started dieting after coaches had advised a reduction in weight. However, it was not reported how many of these athletes developed eating disorders as a result of beginning pathogenic weight loss. Instead, it was found overall that it was not the dieting that was the primary factor but instead whether the athlete received guidance or not that was important. In addition, most researchers agree that coaches do not directly cause eating disorders in athletes by the influencing of dieting behaviour. Instead, it is through inadequate coaching advice on dieting and nutrition that can cause a problem in vulnerable athletes which can further trigger or aggravate a potential eating disordered athlete. Therefore, overall the role of coaches in the development of dieting and eating disorders in athletes is seen more as a part of a complex relations of factors (Sundgot-Borgen, 1994).

Conversely, the NON-LEAN athletes did not appear to have a large external influence in their dieting habits. This may be due to the fact that the NON-LEAN athletes are part of a team, where there is no one specific individual on a routine basis that may influence their dieting behaviour. Instead, influence probably comes from a collection of teammates or individuals as indicated by the small percentages spread throughout coaches, peers, siblings and parents. This idea can be further supported by examining the CONTROL subjects dieting encouragement. The primary people in their lives, their mother and father, encourage the subjects to diet.

Physical Activity Levels and Encouragement

The vast majority of the LEAN and NON-LEAN athletes were categorized as very active, validating their selection to the respective athletic groups as high performance athletes who dedicate a large amount of their time to training. In contrast, the CONTROLS were scattered throughout the physical activity categories with the majority (54.8%) in the moderately active level and 38.2% in the relatively inactive level. The relatively low activity levels of the CONTROL subjects could be one factor that causes these adolescent girls to be heavier and fatter than the athletic subjects.

Encouragement to participate in physical activity for the LEAN and NON-LEAN athletes came from similar influences. Anecdotely, it was evident that their parents had a major involvement and influence in their athletic lives whether it was as a spectator, coach or sponsor. In addition, the parents themselves were active individuals either presently or in the past. Another major

influence on both groups of athletes was their best friend, which often was a teammate or member of the same club (ie. diving, gymnastics or figure skating).

Although the CONTROLS had similar influences for encouragement of physical activity as the athletes, the percentage of subjects who felt they had parental support was considerably lower than the athletic subjects, particularly from their fathers. Anecdotely, this may be explained by the lower socio-economic status of some of the parents and thus a lack of money to be able to pay the fees for their child to participate in any form of organized sport or club. In addition to not having the finances, it could be due to lack of interest in activity or sport participation by both the CONTROL subject and parents. Often the lifestyles of the family and friends will lend a type of encouragement to participate or lead to a general interest in some form of physical activity (Canada's Health and Youth Report, 1992).

Researcher versus Subject Visual Rating

Generally, the findings in the present study with regards to researcher and subject visual rating would support the previous findings of Black and Burckes-Miller (1988b), where female athletes in LEAN emphasized sports routinely perceived themselves fatter than their actual weight or measured body fat. The researcher rating was considered the gold standard because of the training in anthropometric measurement that she had undergone. The LEAN athletes ratings differed with researcher ratings 32.3% of the time. Generally, the LEAN athletes (90%) overestimated their body fat rating, suggesting potential problems with body image, which were

further supported by the findings of the EAT questionnaire. Additionally, literature suggests that it is not uncommon for individuals with the same interests to associate and influence one another. Not only can athletes influence each other to participate in physical activity, but they may pass on body image disturbances and eating disordered tendencies, causing a type of domino effect within the athletic realm (Moriarty and Moriarty, 1991).

The NON-LEAN athletes had the highest percentage of agreement (78.3%) with the researcher rating, and thus were generally accurate perceivers of their body fat. In the percentage (21.7%) that differed from the researcher, some athletes that overestimated their adiposity may have body image problems or were influenced by our cultural ideals of the body, while others that underestimated their adiposity may be comfortable with their larger size and see themselves as ideal.

The CONTROL subjects had the lowest percentage of agreement (52.4%) with the researcher. An interesting finding is that the researcher rated 9 CONTROL subjects as obese, yet only 2 subjects classified themselves as such. Seven of these subjects could thus be considered as expert copers or deniers. These results overall also support the general theories that cultural biases do effect females (both in and out of the sporting realm) no matter what the age, environment or activity involvement (Moriarty and Moriarty, 1991).

Eating Attitudes Test

The LEAN athletes scored significantly higher than the NON-LEAN athletes on the total EAT. The LEAN athletes overall mean

(18.4) was close to the clinical cut-off of >20 (Hersen and Bellack, 1988), which may indicate that these athletes have a tendency to have a range of symptoms of eating disorders. Again this supports the previous literature presented regarding lean emphasized sports.

The LEAN athletes scored significantly higher than the CONTROLS on the Dieting factor. This suggests that the LEAN athletes have a degree of avoidance of fattening foods and pre-occupation with being thinner (Benson et al.,1990). This would support a large portion of the literature that has examined the nature of sport and effect of environment. These range of symptoms seem to be predominantly in athletes that compete in lean emphasized sports (Dummer et al., 1987; Black and Burckes-Miller, 1988b; Benson et al., 1990; Moriarty and Moriarty, 1990; Taub and Blinde, 1992; Sundgot-Borgen, 1993).

The LEAN athletes also scored significantly higher than the NON-LEAN athletes in the Oral Control factor. This would indicate a degree of self-control around eating and the perception of pressure from others to gain or lose weight (Benson et al., 1990). This would also tend to be indicative of the nature of the sport in which athletes were involved. For those in lean-emphasized sports, there is an aesthetic standard of evaluation, and self-control around food would be perceived as necessary and important to compete and win (Warren et al., 1990).

However, it is likely that a certain degree of under-reporting may occur with the EAT and EDI, due to the secretiveness associated with eating disordered tendencies. The discovery of eating disordered tendencies could cost an athlete an opportunity to be part of the team (Sundgot-Borgen, 1994).

Eating Disorder Inventory

Clinically diagnosed anorectics have received total scores above 40 on the EDI (Sundgot-Borgen, 1993); both LEAN athletes (39.8) and CONTROLS (39.0) were close to this borderline, suggesting anorectic tendencies in these two groups. This supports the literature that suggests that athletes, in LEAN emphasized sports, in addition to the female population at the adolescent age, are at risk of developing an eating disorder or abnormal eating behaviours due to the surrounding environment and external pressures (Moriarty and Moriarty, 1991; Black and Burckes-Miller, 1991).

The EDI revealed that the CONTROL subjects and LEAN athletes were significantly different than the NON-LEAN athletes in the subscales of Ineffectiveness and Interpersonal Distrust. This indicates that the LEAN athletes and CONTROL subjects have feelings of general inadequacy, insecurity and feel a lack of control over their lives. Both of these subscales are fundamental to the diagnosis of AN and are an important factor in the development and maintenance of AN (Benson et al., 1990). This could support the idea that since the LEAN athletes are competing primarily in individual sports, constant comparison with other athletes leads to feelings of inadequacy or insecurity with one's abilities. In addition, the CONTROL subjects may be victims of the cultural pressures of their peers, and thus experience constant comparison and feelings of inadequacy. At the adolescent age there would appear to be a time where interpersonal distrust would occur, leading to a sense of alienation and a general reluctance to form close relationships (Benson et al., 1990).

The Interoceptive Awareness subscale indicates a perceived

impairment in recognizing and accurately identifying emotions of hunger and satiety (Benson et al., 1990). The LEAN and CONTROL groups scored significantly higher than the NON-LEAN group in this subscale which could suggest that the LEAN and CONTROL subjects may not only possess eating disordered tendencies but binging and over-eating problems as well. For the CONTROL subjects, this could be further supported by the results previously presented regarding their physical characteristics and visual rating analysis where they were on average heavier and perceived as expert copers or deniers. In addition, the LEAN athletes were the leanest and lightest and had the tendency to overestimate their body fat which suggests an impairment in identifying their feelings of hunger.

It was surprising that there was no significant difference found between groups in the two subscales of Drive for Thinness and Body Dissatisfaction, particularly since a large proportion of LEAN athletes overestimated their adiposity.

Although the NON-LEAN athletes showed significant differences on three subscales (Interoceptive Awareness, Ineffectiveness, and Interpersonal Distrust) than other groups, the athletes exhibited the lowest means on these scales and their overall mean (33.0) is well below the clinical anorectic score. This would also support the literature that suggests that athletes competing in sports which do not emphasize leanness or body weight tend to develop fewer eating disordered tendencies than those athletes competing in lean-emphasized sports (Dummer et al., 1987; Sundgot-Borgen and Corbin, 1987). It could further be explained by the individual versus team environment, and that the athletes that are in the team environment would be encouraged to be lean for health benefits first in addition

to their sport involvement. However, leanness in LEAN athletes may be emphasized for the aesthetic component, in addition to the physical component, and not necessarily the health benefit.

CHAPTER VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

Limited past research has indicated that there is a higher incidence of eating disordered tendencies and low body fat measures among high performance female adolescent athletes in sports that emphasize leanness. However, little is known about how these eating disordered tendencies and body fat measures compare with non-athletic adolescents or athletes in non-weight emphasized sports. In addition, little research has examined the prevalence among female adolescent high performance athletes.

This study assessed the incidence of eating disordered tendencies and body fat measures in high performance female adolescent athletes. Three groups were studied and compared: 1) 31 athletes involved in sports emphasizing leanness (LEAN) (ie. gymnastics, figure skating, diving); 2) 46 athletes involved in sports that do not emphasize leanness (NON-LEAN) (ie. basketball, field hockey, volleyball); and 3) 42 control subjects who did not participate in high performance sport (CONTROL).

The subjects were recruited on a voluntary basis and self-reports were used to assess eating attitudes and behaviours (ie. EDI, EAT and demographic form). Body fat measures consisted of a sum of five skinfolds (tricep, subscapular, bicep, suprailliac, medial calf) in addition to measures of height, weight and a subjective visual rating of adiposity.

The results indicated that the LEAN athletes were significantly shorter, leaner and lighter than the NON-LEAN and CONTROL subjects. Virtually all the NON-LEAN (95%) and CONTROL (100%) and 90% of the LEAN subjects had begun menstruating and approximately 27.3% were not menstruating on a regular basis. The menstruation irregularity percentage of the CONTROL and NON-LEAN subjects is similar to the LEAN subjects (29.0%) percentage suggesting that this could be the norm for both adolescent female athletes and CONTROLS.

The majority of the subjects (60%) had never dieted, which may be attributed to the lack of definition of the word "diet". Approximately 30% of the subjects in each group had dieted 1 - 5 times. The LEAN athletes considered their coaches the most influential person with regards to their dieting behaviour whereas the NON-LEAN athletes and CONTROLS did not appear to have a large external influence in their dieting habits.

Logically, the vast majority of the LEAN and NON-LEAN athletes were categorized as very active, in contrast to the CONTROL subjects, who were scattered throughout the physical activity categories, with the majority in the moderately active level (54.8%) and 38.2% in the relatively inactive level.

The LEAN subjects had a 67.8% agreement for the visual rating scale with the researcher and those athletes that differed from the researcher primarily overestimated their adiposity. The NON-LEAN subjects had the highest rate of agreement (78.3%) and were considered relatively accurate perceivers. In contrast, the CONTROL subjects were considered expert copers or deniers with a 52.4% agreement.

In the EDI, the overall mean for the LEAN athletes (39.8) suggests that the athletes were on the borderline of a clinically diagnosed anorectic (>40).

Conclusions

From the results and within the limitations of the present study, the following conclusions appear justified:

1. Athletes in lean emphasized sports were predominantly leaner, lighter, shorter and exhibited more eating disordered tendencies than the athletes in non-lean emphasized sports.
2. The results for the CONTROL adolescent females for this study indicate that there are pressures outside the realm of sport occurring and that due to these females are susceptible to eating disordered tendencies.
3. Athletes participating in the LEAN emphasized sports have a tendency to overestimate their adiposity level.

Recommendations for further study

1. There is a need to validate self-report guides with athletes and identify the conditions under which self-reporting of eating disturbances is most likely to be accurate.
2. Future studies should consider learning more about the risk factors and aetiology of eating disorders in athletes at different levels of competition.
3. There is a need for a detailed study that looks at the short and long term effects of eating disordered tendencies upon the adolescent athletes' (and younger) health and athletic performance.

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Appendix A

Eating Disorder Inventory

ID#: _____

Date: _____

Age: _____

This is a scale which measures a variety of attitudes, feelings and behaviours. Some of the items relate to food and eating. Others ask you about your feelings about yourself. **THERE ARE NO RIGHT OR WRONG ANSWERS SO TRY VERY HARD TO BE COMPLETELY HONEST IN YOUR ANSWERS.** Read each question and place an (X) under the column which applies best for you. Please answer each question very carefully. **RESULTS ARE COMPLETELY CONFIDENTIAL.** Thank you.

ALWAYS	USUALLY	OFTEN	SOMETIMES	RARELY	NEVER		
( )	( )	( )	( )	( )	( )	1.	I eat sweets and carbohydrates without feeling nervous.
( )	( )	( )	( )	( )	( )	2.	I think that my stomach is too big.
( )	( )	( )	( )	( )	( )	3.	I wish that I could return to the security of childhood.
( )	( )	( )	( )	( )	( )	4.	I eat when I am upset.
( )	( )	( )	( )	( )	( )	5.	I stuff myself with food.
( )	( )	( )	( )	( )	( )	6.	I wish that I could be younger.
( )	( )	( )	( )	( )	( )	7.	I think about dieting.
( )	( )	( )	( )	( )	( )	8.	I get frightened when my feelings are too strong.
( )	( )	( )	( )	( )	( )	9.	I think that my thighs are too large.
( )	( )	( )	( )	( )	( )	10.	I feel ineffective as a person.
( )	( )	( )	( )	( )	( )	11.	I feel extremely guilty after overeating.
( )	( )	( )	( )	( )	( )	12.	I think that my stomach is just the right size.

ALWAYS	USUALLY	OFTEN	SOMETIMES	RARELY	NEVER		
( )	( )	( )	( )	( )	( )	13.	Only outstanding performance is good enough in my family.
( )	( )	( )	( )	( )	( )	14.	The happiest time in life is when you are a child.
( )	( )	( )	( )	( )	( )	15.	I am open about my feelings.
( )	( )	( )	( )	( )	( )	16.	I am terrified of gaining weight.
( )	( )	( )	( )	( )	( )	17.	I trust others.
( )	( )	( )	( )	( )	( )	18.	I feel alone in the world.
( )	( )	( )	( )	( )	( )	19.	I feel satisfied with the shape of my body.
( )	( )	( )	( )	( )	( )	20.	I feel generally in control of things in my life.
( )	( )	( )	( )	( )	( )	21.	I get confused about what emotion I am feeling.
( )	( )	( )	( )	( )	( )	22.	I would rather be an adult than a child.
( )	( )	( )	( )	( )	( )	23.	I can communicate with others easily.
( )	( )	( )	( )	( )	( )	24.	I wish I were someone else.
( )	( )	( )	( )	( )	( )	25.	I exaggerate or magnify the importance of weight.
( )	( )	( )	( )	( )	( )	26.	I can clearly identify what emotion I am feeling.
( )	( )	( )	( )	( )	( )	27.	I feel inadequate.
( )	( )	( )	( )	( )	( )	28.	I have gone on eating binges where I have felt that I could not stop.
( )	( )	( )	( )	( )	( )	29.	As a child, I tried very hard to avoid disappointing my parents and teachers.
( )	( )	( )	( )	( )	( )	30.	I have close relationships.
( )	( )	( )	( )	( )	( )	31.	I like the shape of my buttocks.

ALWAYS	USUALLY	OFTEN	SOMETIMES	RARELY	NEVER		
( )	( )	( )	( )	( )	( )	32.	I am preoccupied with the desire to be thinner.
( )	( )	( )	( )	( )	( )	33.	I don't know what's going on inside me.
( )	( )	( )	( )	( )	( )	34.	I have trouble expressing my emotions to others.
( )	( )	( )	( )	( )	( )	35.	The demands of adulthood are too great.
( )	( )	( )	( )	( )	( )	36.	I hate being less than best at things.
( )	( )	( )	( )	( )	( )	37.	I feel secure about myself.
( )	( )	( )	( )	( )	( )	38.	I think about bingeing (overeating).
( )	( )	( )	( )	( )	( )	39.	I feel happy that I am not a child anymore.
( )	( )	( )	( )	( )	( )	40.	I get confused as to whether or not I am hungry.
( )	( )	( )	( )	( )	( )	41.	I have a low opinion of myself.
( )	( )	( )	( )	( )	( )	42.	I feel that I can achieve my standards.
( )	( )	( )	( )	( )	( )	43.	My parents have expected excellence of me.
( )	( )	( )	( )	( )	( )	44.	I worry that my feelings will get out of control.
( )	( )	( )	( )	( )	( )	45.	I think my hips are too big.
( )	( )	( )	( )	( )	( )	46.	I eat moderately in front of others and stuff myself when they're gone.
( )	( )	( )	( )	( )	( )	47.	I feel bloated after eating a small meal.
( )	( )	( )	( )	( )	( )	48.	I feel that people are happiest when they are children.
( )	( )	( )	( )	( )	( )	49.	If I gain a pound, I worry that I will keep gaining.
( )	( )	( )	( )	( )	( )	50.	I feel that I am a worthwhile person.

ALWAYS	USUALLY	OFTEN	SOMETIMES	RARELY	NEVER		
( )	( )	( )	( )	( )	( )	51.	When I am upset, I don't know if I am sad, frightened or angry.
( )	( )	( )	( )	( )	( )	52.	I feel that I must do things perfectly or not do them at all.
( )	( )	( )	( )	( )	( )	53.	I have the thought of trying to vomit in order to lose weight.
( )	( )	( )	( )	( )	( )	54.	I need to keep people at a certain distance (feel uncomfortable if someone tries to get too close).
( )	( )	( )	( )	( )	( )	55.	I think that my thighs are just the right size.
( )	( )	( )	( )	( )	( )	56.	I feel empty inside (emotionally).
( )	( )	( )	( )	( )	( )	57.	I can talk about personal thoughts or feelings.
( )	( )	( )	( )	( )	( )	58.	The best years of your life are when you become an adult.
( )	( )	( )	( )	( )	( )	59.	I think by buttocks are too large.
( )	( )	( )	( )	( )	( )	60.	I have feelings I can't quite identify.
( )	( )	( )	( )	( )	( )	61.	I eat or drink in secrecy.
( )	( )	( )	( )	( )	( )	62.	I think that my hips are just the right size.
( )	( )	( )	( )	( )	( )	63.	I have extremely high goals.
( )	( )	( )	( )	( )	( )	64.	When I am upset, I worry that I will start eating.

Appendix B

Eating Attitudes Test

ID#: _____

Date: _____

Age: _____

Please place an (X) under the column which applies best to each of the numbered statements. All of the results will be **STRICTLY CONFIDENTIAL**. Most of the questions directly relate to food or eating, although other types of questions have been included. Please answer each question carefully. Thank you.

ALWAYS	VERY OFTEN	OFTEN	SOMETIMES	RARELY	NEVER		
( )	( )	( )	( )	( )	( )	1.	Am terrified about being overweight.
( )	( )	( )	( )	( )	( )	2.	Avoid eating when I am hungry.
( )	( )	( )	( )	( )	( )	3.	Find myself preoccupied with food.
( )	( )	( )	( )	( )	( )	4.	Have gone on eating binges where I feel that I may not be able to stop.
( )	( )	( )	( )	( )	( )	5.	Cut my food into small pieces.
( )	( )	( )	( )	( )	( )	6.	Aware of the calorie content of foods that I eat.
( )	( )	( )	( )	( )	( )	7.	Particularly avoid foods with a high carbohydrate content (eg. bread, potatoes, rice, etc.).
( )	( )	( )	( )	( )	( )	8.	Feel that others would prefer if I ate more.
( )	( )	( )	( )	( )	( )	9.	Vomit after I have eaten.
( )	( )	( )	( )	( )	( )	10.	Feel extremely guilty after eating.
( )	( )	( )	( )	( )	( )	11.	Am preoccupied with a desire to be thinner.
( )	( )	( )	( )	( )	( )	12.	Think about burning up calories when I exercise.

ALWAYS	USUALLY	OFTEN	SOMETIMES	RARELY	NEVER		
( )	( )	( )	( )	( )	( )	13.	Other people think that I am too thin.
( )	( )	( )	( )	( )	( )	14.	Am preoccupied with the thought of having fat on my body.
( )	( )	( )	( )	( )	( )	15.	Take longer that others to eat my meals.
( )	( )	( )	( )	( )	( )	16.	Avoid food with sugar in them.
( )	( )	( )	( )	( )	( )	17.	Eat diet foods.
( )	( )	( )	( )	( )	( )	18.	Feel that food controls my life.
( )	( )	( )	( )	( )	( )	19.	Display self control around food.
( )	( )	( )	( )	( )	( )	20.	Feel that others pressure me to eat.
( )	( )	( )	( )	( )	( )	21.	Give too much time and thought to food.
( )	( )	( )	( )	( )	( )	22.	Feel uncomfortable after eating sweets.
( )	( )	( )	( )	( )	( )	23.	Engage in dieting behaviour.
( )	( )	( )	( )	( )	( )	24.	Like my stomach to be empty.
( )	( )	( )	( )	( )	( )	25.	Enjoy trying new rich foods.
( )	( )	( )	( )	( )	( )	26.	Have the impulse to vomit after meals.

Appendix C

DEMOGRAPHIC QUESTIONNAIRE (athlete)

ID#: _____ POSTAL CODE: _____ RACE: CAUCASIAN ___
HISPANIC ___
AGE: _____ ETHNIC GROUP: _____ AFRICAN-AMERICAN ___
ORIENTAL ___
TEAM: _____ EAST INDIAN ___
OTHER _____

1. Are you currently menstruating? YES NO

2. At what age did you begin menstruating? _____yrs

3. Do you menstruate regularly? YES NO

4. Please describe your physical activity:
   a) relatively inactive _____
   (no activity outside of scheduled PE classes)

   b) moderately active _____
   (1-3 sessions of physical activity per week,
   for at least 15 minutes/session, outside of PE classes)

   c) very active _____
   (4+ sessions of physical activity per week,
   for at least 15 minutes/session outside of PE classes)

5. Do others encourage you to participate in sport or physical activity?
   (check as many as you want)
   mother ___ father ___ sister ___
   other _____ brother ___ best friend ___ teacher ___

6. When did you start participating in sports? AGE _____

7. Have you ever dieted before? YES NO

   If YES, how many times?

   1 - 5 ___ 5 - 10 ___ 10 - 15 ___ 15 - 20 ___ 20+ ___

   If YES, did other people encourage you to diet?
   (check as many as you want)

   mother ___ father ___ sister ___ brother ___ friend ___

   teacher ___ coach ___ doctor ___ other _____

Appendix C

DEMOGRAPHIC QUESTIONNAIRE II (students)

ID#: _____ POSTAL CODE: _____

AGE: _____

1. Are you currently menstruating? YES NO

2. At what age did you begin menstruating? _____yrs

3. Do you menstruate regularly? YES NO

4. Please describe your physical activity:
   a) relatively inactive _____
   (no activity outside of scheduled PE classes)

   b) moderately active _____
   (1-3 sessions of physical activity per week,
   for at least 15 minutes/session, outside of PE classes)

   c) very active _____
   (4+ sessions of physical activity per week,
   for at least 15 minutes/session outside of PE classes)

5. Do others encourage you to participate in sport or physical activity?
   (check as many as you want)
   mother ___ father ___ sister ___
   other _____ brother ___ best friend ___ teacher ___

6. When did you start participating in sports? AGE _____

7. Have you ever dieted before? YES NO

   If YES, how many times?
   1 - 5 ___ 5 - 10 ___ 10 - 15 ___ 15 - 20 ___ 20+ ___

   If YES, did other people encourage you to diet?
   (check as many as you want)

   mother ___ father ___ sister ___ brother ___ friend ___

   teacher ___ coach ___ doctor ___ other _____

Appendix D

Letter of Informed Consent (students)

February 2, 1994

Dear Parents/Guardians:

A graduate student from the University of Alberta will be conducting a thesis study on eating attitudes and behaviours of female adolescents aged 14-18 years within the Edmonton High School System during February and March, 1994. Your daughter has been one of 35 students selected from chosen junior high and high schools in Edmonton to participate in this study.

The measurements required for this study will include height, weight, a subject visual rating of body fat by both the subject and trained researcher, a demographic form, five skinfold thickness measurements, and two questionnaires, the Eating Disorder Inventory (EDI) and the Eating Attitudes Test (EAT). All measures will be taken during the physical education or health class at the junior high or high school and will not take longer than approximately 45 minutes.

The body fat measurements to be taken are standard measures used in typical fitness tests and there will be virtually no risk to the student. The two questionnaires will provide a measure of distinguishing eating attitudes and behaviours and will help determine eating disordered tendencies in individuals. Only group data will be reported, and all records will be kept strictly confidential.

The participation in this study is voluntary, your daughter will be free to withdraw from the study at any time with no penalty.

If you consent to have your daughter participate in this study, please complete the enclosed form. If you have any questions regarding this study, please feel free to phone me at 438-2737. Thank you for your consideration.

Sincerely,

Paula Baker
Graduate Student
Dept. of Physical Education
and Sport Studies

Appendix D

CONSENT FORM (students)

TITLE: Eating Attitudes and Behaviours in Female Adolescent Athletes.

I hereby certify that _____ (student's name), for which I am the parent/guardian, is allowed to participate in the research study directed by Dr. Dru Marshall and Paula Baker, that will take place within _____ (school name). I understand fully all of the following statements.

1. The measurements to be taken include: height, weight, a demographic form, a subject visual rating of body fat by both the subject and trained reseacher, five skinfolds, and 2 questionnaires, the Eating Disorder Inventory (EDI) and the Eating Attitudes Test (EAT). I understand that there is virtually no danger or risk in the performance of these tests.
2. The disruption to the student's normal school routine will be minimal.
3. I agree that my daughter will voluntarily participate in the study as it is described. I understand that my daughter has the right to withdraw from the study at any time with no penalty. I understand that there is no financial remuneration for participation in this study.
4. My daughter's identity will not be disclosed during the time of her participation, in the future, or in any published results.
5. I understand that should I have any questions related to any part of my daughter's participation in this project, my questions will be answered fully and to my total satisfaction.
6. I hereby make available to Dru Marshall and Paula Baker at the University of Alberta all results obtained as consequence of my daughter's participation in this project whether these results are in individual or group form.
7. I further certify that all procedures in which my daughter will be involved have been fully explained to me, and will be fully explained to my daughter. Any rights have also been fully explained to me. I hereby declare that I am totally satisfied with these explanations.
8. I understand that this study will further research aimed at eating attitudes and behaviours in adolescent females.

The persons who may be contacted about the research are:

Paula Baker 438-2737

Dru Marshall, Ph.D. 492-1035

_____
(name please print)

_____
(guardian/parent signature)

_____
(name of witness)

_____
(signature of witness)

_____
(Date)

_____
(signature of principal investigator)

Appendix D

Letter of Informed Consent (athletes)

February 2, 1994

Dear Parents/Guardians:

A graduate student from the University of Alberta will be conducting a thesis study on eating attitudes and behaviours of high performance female adolescents athletes aged 14-18 years during February and March, 1994. Your daughter has been one of 70 athletes selected from eligible provincial sports programs in Edmonton to participate in this study.

The measurements required for this study will include height, weight, a subjective visual rating of body fat by both the subject and trained researcher, a demographic form, five skinfold thickness measurements, and 2 questionnaires, the Eating Disorder Inventory (EDI) and the Eating Attitudes Test (EAT). All measures will be taken within the athletic setting and will not take longer than approximately 45 minutes.

The body fat measurements to be taken are standard measures used in typical fitness tests and there will be virtually no risk to the athlete. The two questionnaires will provide a measure of distinguishing eating attitudes and behaviours and will help determine eating disordered tendencies in individuals. Only group data will be reported and all records will be kept strictly confidential.

The participation in this study is voluntary, your daughter will be free to withdraw from the study at any time with no penalty.

If you consent to have your daughter participate in this study, please complete the enclosed form. If you have any questions regarding this study, please feel free to phone me at 438-2737. Thank you for your consideration.

Sincerely,

Paula Baker
Graduate Student
Dept. of Physical Education
and Sport Studies

Appendix D

CONSENT FORM (athletes)

TITLE: Eating Attitudes and Behaviours in Female Adolescent Athletes.

I hereby certify that _____ (athlete's name), for which I am the parent/guardian, is allowed to participate in the research study directed by Dr. Dru Marshall and Paula Baker, that will take place within _____ (athletic setting). I understand fully all of the following statements.

1. The measurements to be taken include: height, weight, a demographic form, a subjective visual rating of body fat by both the subject and trained researcher, five skinfolds, and 2 questionnaires, the Eating Disorder Inventory (EDI) and the Eating Attitudes Test (EAT). I understand that there is virtually no danger or risk in the performance of these tests.
2. The disruption to the athlete's normal routine will be minimal.
3. I agree that my daughter will voluntarily participate in the study as it is described. I understand that my daughter has the right to withdraw from the study at any time with no penalty. I understand that there is no financial remuneration for participation in this study.
4. My daughter's identity will not be disclosed during the time of her participation, in the future, or in any published results.
5. I understand that should I have any questions related to any part of my daughter's participation in this project, my questions will be answered fully and to my total satisfaction.
6. I hereby make available to Dru Marshall and Paula Baker at the University of Alberta all results obtained as consequence of my daughter's participation in this project whether these results are in individual or group form.
7. I further certify that all procedures in which my daughter will be involved have been fully explained to me, and will be fully explained to my daughter. Any rights have also been fully explained to me. I hereby declare that I am totally satisfied with these explanations.
8. I understand that this study will further research aimed at eating attitudes and behaviours in high performance adolescent females.

The persons who may be contacted about the research are:
Paula Baker 438-2737
Dru Marshall, Ph.D. 492-1035

_____ (Date)

_____
(signature of principal investigator)

_____
(name please print)

_____
(guardian/parent signature)

_____
(name of witness)

_____
(signature of witness)